

**METHOD FOR SIMULATING DRILLING OF ROLLER CONE BITS AND ITS
APPLICATION TO ROLLER CONE BIT DESIGN AND PERFORMANCE**

ABSTRACT

A method for simulating the drilling performance of a roller cone bit drilling an earth formation may be used to generate a visual representation of drilling, to design roller cone drill bits, and to optimize the drilling performance of a roller cone bit. The 5 method for generating a visual representation of a roller cone bit drilling earth formations includes selecting bit design parameters, selecting drilling parameters, and selecting an earth formation to be drilled. The method further includes calculating, from the bit design parameters, drilling parameters and earth formation, parameters of a crater formed when one of a plurality of cutting elements contacts the earth formation. The method 10 further includes calculating a bottomhole geometry, wherein the crater is removed from a bottomhole surface. The method also includes incrementally rotating the bit and repeating the calculating of crater parameters and bottomhole geometry based on calculated roller cone rotation speed and geometrical location with respect to rotation of said roller cone drill bit about its axis. The method also includes converting the crater 15 and bottomhole geometry parameters into a visual representation.

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